Behind the Tabs

How a zealous illustrator, an ace paper engineer, and a skilled Chinese assembly team created an amazing movable book.

By Paul O. Zelinsky

I'm a nosy illustrator. Bookmaking involves many tasks, many stages, from the initial creation of text and art to the distribution of finished books, and I wish I could know all about all of them. When I made my first moving-parts book, *The Wheels on the Bus*, I worked to some extent with the production staff and with the paper engineer of the packaging company that was engaged to produce the book. But when the idea came to me to undertake a second project of this nature —a moving-parts book of the song "This Old Man," with a cast of ten tiny old men playing knick-knack on the person of a full-sized boy—I decided I wanted to be much more involved. I wanted to work not with a packager but directly with a freelance paper engineer. And I wanted to learn everything about how a movable book is made.

First, I had to create a mockup, or dummy, of the book, which I decided to call *Knick-Knack Paddywhack!* Doodling compulsively, I zeroed in on images of a boy and ten old men from different walks of life. Then I made up eleven dogs to go with them. Out of the nonsense words of the song, I devised a story line, and a set of eight spreads emerged, with ideas for what parts would move, and how. I built working mechanics for a few of my pages, but they were dull compared to what I hoped for from my paper-engineer collaborator.

How to find this person? I asked three experts—two collectors and pop-up master Robert Sabuda—for recommendations. Ellen Rubin, whose collection holds over 3,500 movable books, offered to let me browse in her library. I used the visit to ogle books by the great paper-engineering pioneer Lothar Meggendorfer, and some intriguing pages by Julian Wehr, another artist who, like Meggendorfer, animated his pictures with multiple movements operated by a single pull tab. I also thoroughly enjoyed the one book in Ellen's collection engineered by the paper engineer who appeared on all three of my recommended lists, whom Robert Sabuda had singled out as a *wunderkind* of pull tabs. Andrew Baron was based in New Mexico—nowhere near my Brooklyn studio, but then none of the recommended engineers even lived in the Northeast. So I approached Andy by e-mail. He answered me promptly; he knew *Wheels*, he was interested in my project, and soon we were ready to start. This was in April of 2001.

We agreed to begin with the biggest challenge: the last page in the book, in which an orchestra of old men all play music on their numerals—ten actions that I wanted to be set in motion by a single pull tab. I had imagined the motions while drawing them, and I built a model in which the simple moving pieces worked nicely, rotating around pivots constructed of paper, but they had to be manipulated individually by hand.

I faxed Andy my sketch of the page, and he made photocopies on stiff paper, cut them up, played with them, and within a few days had a rough working model that tied most of the actions to one tab. Then he began to refine, finding ways to make the parts move more smoothly, not bind or buckle or catch on each other. I learned that the bulk of his work was in this process: fine-tuning shapes and proportions to lessen friction and avoid interference. Sometimes his adjustments would not affect the art; sometimes they would have to. We spoke at great length on the phone and exchanged a lot of e-mails. Andy liked to describe what he was doing, and why; precise description was as important as it was difficult. This is from an e-mail he sent me about the book's final spread:

> If and when you refine shapes of figures' arms (applies mostly to 2, 6, 8, and 9), pay especial attention to maintaining the depth of the armpits and crooks of the elbow. If depth in these cuts is reduced, we have to pull the mating cuts inward as well, or we drastically reduce the amount of action. Relocating the

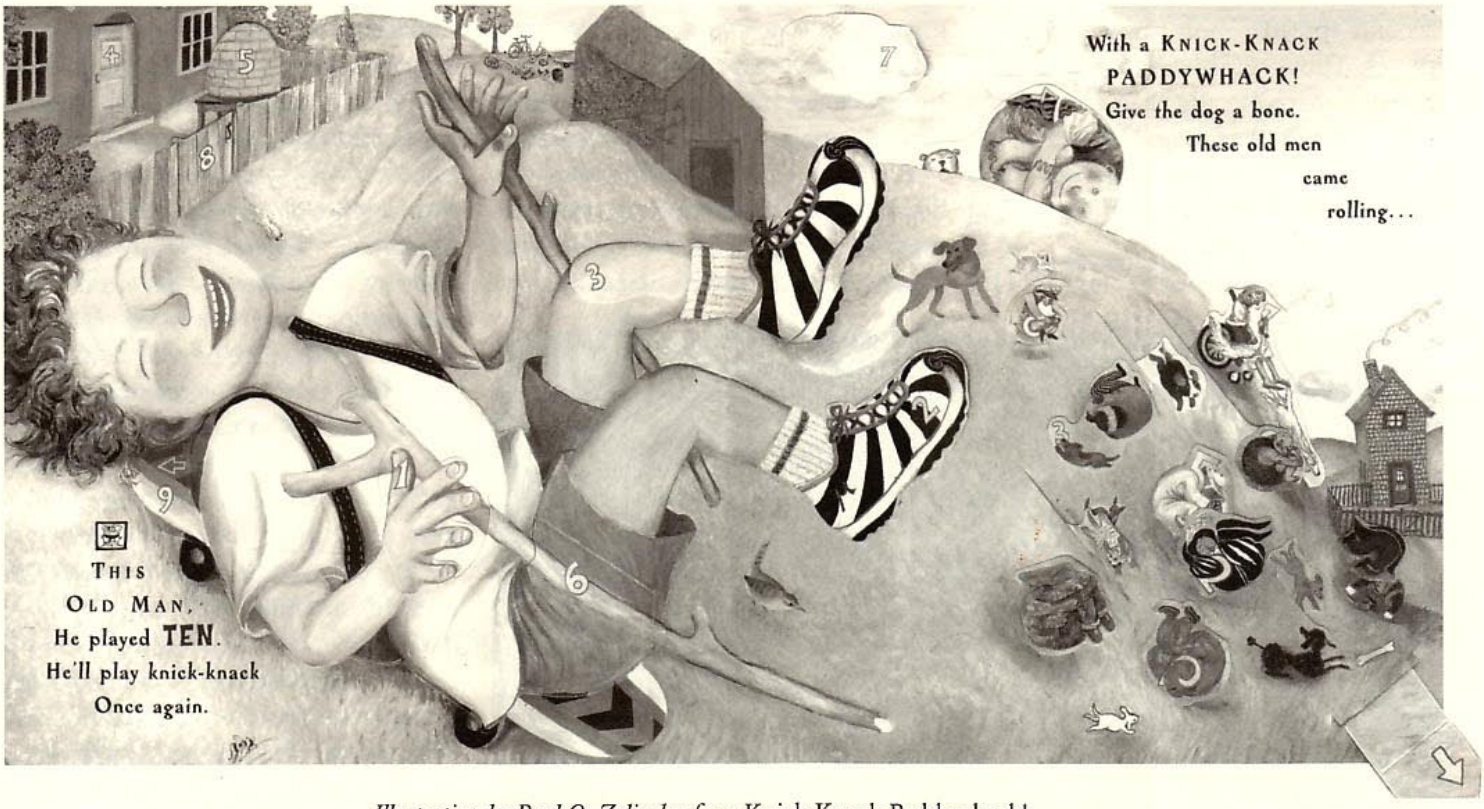

Illustration by Paul O. Zelinsky, from Knick-Knack Paddywhack!

arm pivots may allow for die shape changes that result in a more natural action....I haven't shortened the pull-tab slot, but it looks like there's practically no movement for the first quarter inch (apart from #7). At 3/8" I think we begin to sacrifice the swing of actions a bit. How about cutting 5/16" from the left end of the slot?

Sounds pretty mind-numbing, doesn't it? As our attempts to explain small changes in clear words fell into confusion, we were helped by communications technology. We would stop in the middle of a phone conversation, one of us would make a little sketch, stick it in his phone/fax machine, press the "send" button, and wait for the drawing to emerge from the phone/fax machine at the other end. Then we'd continue our conversation with a diagram to talk about. It was fantastic. The recipient of the sketch could adjust an outline, stick the paper back into the fax machine, and back it would come, oblivious to the 2,000 miles between us. When we wanted to refer to more complex images, we would send digital photos or scans via computer, as e-mail attachments.

We came up with another technological solution for not being in the same room: when a working model was done, Andy would tape it to a board, mount his digital camera on a tripod, take ten or twelve pictures of the model in consecutive stages of its movement, and send the pictures to me by e-mail. A program I owned turned these files into a movie, which I'd send back to Andy and also to my editor. The movies were great fun; they appeared to show tabs moving magically with no hand pulling them, and they had a jerky, silent movie quality.

Long phone conversations and extensive e-mail became a daily routine. In the course of all this communicating, we got to know each other. Holidays came and went, relatives visited; we talked about our families, our high school experiences, our beliefs in fate and faith. We discovered that *Stuart Little* and *The Twenty-One Balloons* had been favorite childhood books for both of us. Then we returned to how Dog Nine should get his bone, or to Old Man Three and the location of his pull tab.

Summer came. Everything took longer than expected. The second spread was throwing up obstacles: a movement that worked fine for Andy seemed to buckle in New York. Probably it was the humidity (100 percent for me; 0 percent in Santa Fe). We wanted to finish before November, when I was scheduled to go on tour with another book. Andy and I struggled forward, taking up one problem after another, talking and faxing so much that we were spending more time together than with our spouses. It was hard to conceive that we had never actually met. By mid-August, both sides of the eighth spread were engineered and its twenty-five pieces of art painted, as well as the

second spread's more modest fifteen pieces. Those spreads were more complicated mechanically than the rest of the book, but there were six spreads and a cover still to go, and time was running short. Both my workdays and Andy's grew longer.

On the morning of September 11, my wife phoned me from her sixth-grade classroom two blocks from my studio, where she and her class were looking out the window at a burning World Trade Center. I walked two short blocks to the waterfront and saw the most awful sight of my life, the huge plane plowing into the second skyscraper as a fireball rose up its side. Through the emergency that followed, and the trauma that visited the city and my family as well, I tried as best I could to keep working on this project. Somehow, all the art and engineering for the book was completed by early February, allowing—just barely—for a fall 2002 publication date. *Knick-Knack Paddywhack!* was set to be printed in May, by Hua Yang printers in Shenzhen City, China. I would be going along, to make the final color choices and to respond to any adjustments in the mechanics that might affect the art.

Above: On one floor of a factory building in Shenzhen City, China, workers at long tables hand-assemble the 200-plus paper parts that make up Knick-Knack Paddywhack! *Below: Finishing touches are added to the final spread: Old Man Three's left hand is being folded over and glued flat. In the assembler's hand is a brush loaded with glue.*

It was an experience I would not trade for anything, to fly to Hong Kong and spend ten days seeing how pop-up books are manufactured. And I do mean manufactured, in the etymological sense of the word: they are made by hand.

I saw the printing presses with their stacks of heavy paper sheets and their rollers full of colored inks.

I saw the large cookie cutters called die moulds, wooden boards laid out with sharp blades bent to match a guide drawing that the paper engineer creates, used to punch the large printed sheets into the component parts that make the book—pages, moving parts, hidden mechanical works, and all. The punching was done by huge machines that pounded the sheets against the die blades—one sheet at a time!

I saw rooms full of assemblers, sitting at long tables with stacks of pieces in front of them, each armed with a bottle of glue and a wipe rag, folding, gluing, pressing together, putting a piece down and going on to the next one. I marveled at their skill and speed. The work that would go into each copy of *Knick-Knack Paddywhack!* was humbling to consider.

Once the printing of our book was under way, I worked for several days with press operators to make the color of the printed sheets as vibrant and harmonious as possible. Some of the pressmen

spoke no English, but we could communicate on paper, pointing and referring to ink adjustments: "-C, +++Y" (less cyan, much more yellow).

Then one morning I saw Andy, my paper engineer, walk into the room. After having spent a full year, almost every day, with a virtual Andy, meeting the real-life one was disorienting. His vital job on press was to trouble-shoot the inevitable flaws that would crop up as the die making, die cutting, and assembly were worked out.

As amazing as I had found my communication with Andy over the preceding months, it was even more fascinating to discover that communication was possible between Andy and me and the Chinese paper engineers, even those with little or no English, standing over model mechanics and stamped, printed sheets, discussing potential problems and solutions, without resorting to any spoken language. We relied on the language of point-and-sketch, point-and-look, point-and-move.

Although *Knick-Knack Paddywhack!* has English words (which are guaranteed not to be translatable into anything else), its basic language is point-and-move. My greatest hope is that the book may be appreciated equally by aficionados of paper engineering and by youngsters who still use point-and-move as their basic language.

Paul O. Zelinsky adapted and illustrated The Wheels on the Bus *as well as* Rapunzel, *which won the 1997 Caldecott Medal. His other books include three Caldecott Honor books and feature texts by such well-known authors as Beverly Cleary and Jack Prelutsky.* Knick-Knack Paddywhack! *is his twenty-fifth book for children.*

See these Web sites:

KNICK-KNACK PADDYWHACK!
www.paulozelinsky.com

ROBERT SABUDA
www.robertsabuda.com

POP-UP COLLECTOR
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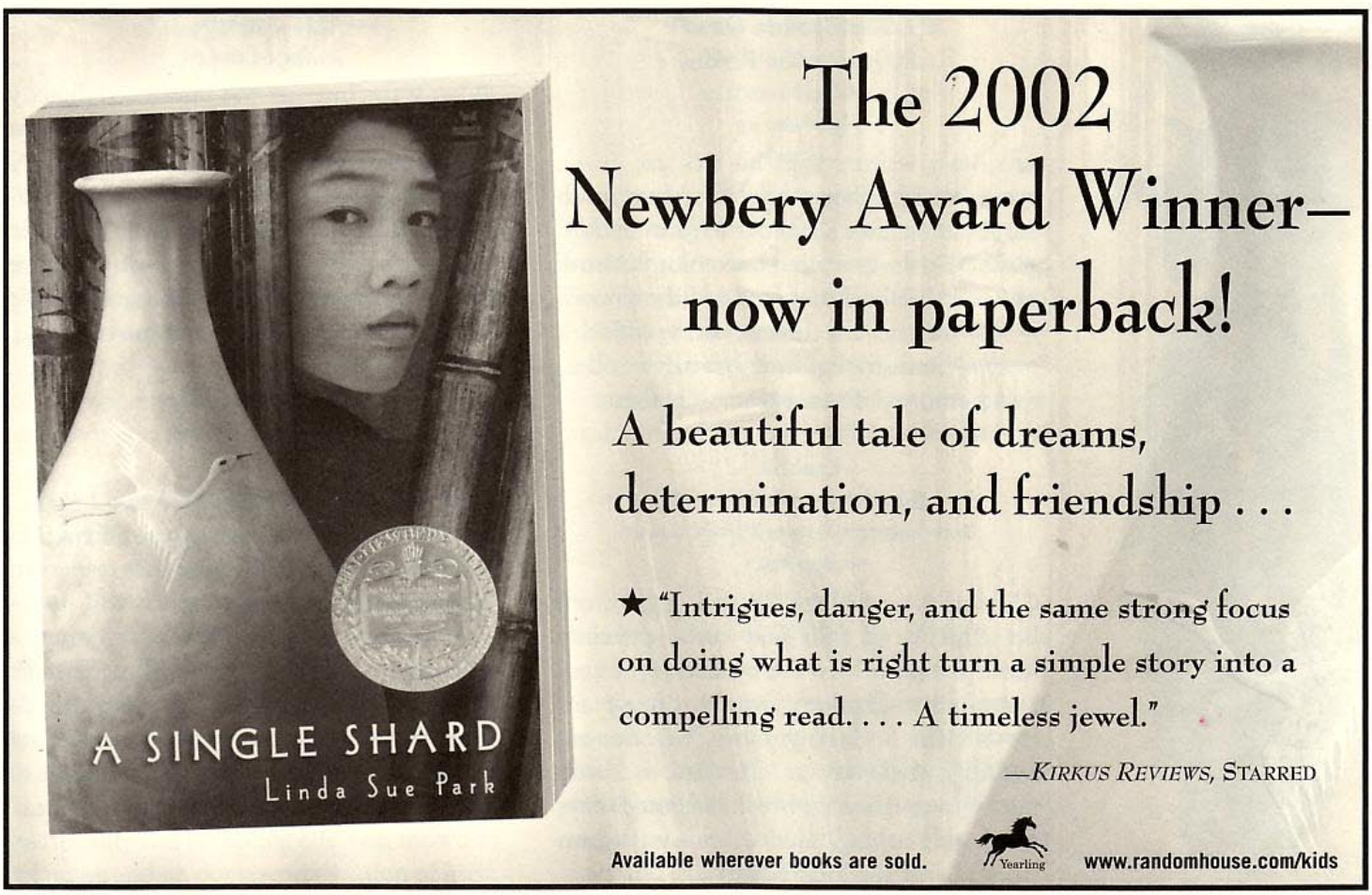
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